Doc Code: AP.PRE.REQ

PTO/SB/33 (07-05)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional): 706.003 PA

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on August 3, 2006

Signature: Jody Y. Brown

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Application Number	Filed
10/717,875	11-20 2003

First Named Inventor: Robert H Feldmeier

Art Unit	Examiner
1716	D Becker

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

- ☐ applicant/inventor.
- ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)
- ☒ attorney or agent of record. Registration number 28,973
- ☐ attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

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August 3, 2006
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NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Robert H. Feldmeier
Ser. No. 10/717,875
Filed November 20, 2003
For: UHT Pasteurizer with Regeneration

Attorney Docket No. 706.003PA
Art Unit: 1761

Examiner: Drew E. Becker

PRE-APPEAL BRIEF REVIEW

Commissioner for Patents
Mail Stop – AF
P.O. Box 1450
Alexandria VA 22313-1450

Sir:

Applicant respectfully urges that the Final Rejection of independent Claims 1, 11, and 13 and their dependent claims 2-6, 9, 10, 12, and 14-20, is improper. The subject matter of original claims 7 and 8 has been incorporated into Claim 1, and the same limitations have also been incorporated into the other independent claims 11 and 13.

Applicant's position is that the Final Rejection is improper in the absence of a prior art reference that teaches the the importance of denaturing the milk at 175° F for a full minute before sending the milk up through the regenerative heat exchanger to the UHT heater.

The invention concerns a highly efficient technique for making ultra-high pasteuized milk, i.e., sterile or long-life milk, which can have a long shelf life without refrigeration, and which does not pick up any off flavors in the process that are noticeable when the milk is drunk. As discussed in the description, this technique is highly efficient, with a high regeneration coefficient (ninety percent).

The pertinent part of the currently amended Claim 1 is as follows:

> *"flowing the liquid food product at said intermediate temperature through a timing tube to hold the product at said intermediate temperature for a predetermined time sufficient for denaturing said proteins therein, wherein said predetermined intermediate temperature at which said denaturing occurs is substantially 175 degrees F, and wherein said predetermined time that said*

timing tube holds the product at said intermediate temperature is at least sixty seconds;

and then,

flowing said liquid food product from said timing tube through a raw-product side of said second regenerative heat exchanger to preheat the same from said intermediate temperature to a temperature near a UHT pasteurizing temperature".

Notably, the hold tube or timing tube *holds* the product temperature at substantially 175° for the 60 second (or more) time interval, which is entirely different from letting the product temperature continue to rise during that time interval.

The conventional approach to UHT pasteurization is to heat the milk up to near the UHT temperature as quickly as possible to keep the milk from burning on or depositing on the walls of the heat exchanger. If this is not done quickly, the milk proteins can deposit out onto the inner walls, especially in the part of the regenerator going from normal or HT temperatures (175° F) to about 265° F. However, running the milk through quickly means that the regeneration is much lower, which raises the energy cost.

What Applicant has discovered is that if the milk is held at the intermediate or HT temperature, e.g., 175°, for at least a ***full minute***, before being sent through the upper regenerator stage, the milk proteins do not deposit on the regenerator walls. The reason is that a transformation of the shape of the milk protein molecules takes place, referred to as denaturing, and if this is done by holding the milk at this temperature for this length of time, the milk proteins do not deteriorate at temperatures higher than this.

The denaturing and the importance of this step, in respect to the present invention, are discussed e.g. at page 10, lines 9 to 12, page 11, line 24 to page 12, line 1, and page 12, lines 10 to 16. The milk is held at this temperature (e.g., 175° F) for a sufficient time for denaturing to take place, which depends on the nature of the product. For some typical milk products, the hold time for denaturing can be 60 seconds to 300 seconds. This is longer than the "legal" time (e.g., 15 -16 seconds) required to make the product safe for consumption.

It is conventional for the HT holding tube, i.e., "legal" holding tube, to be long enough to

hold the milk at 175° for sixteen seconds. It was believed that temperature damage to the milk, i.e., scalding, would occur if the milk dwelt at that temperature for much longer than that. At the same time, sixteen seconds has been found to be sufficient time for every particle in the milk to be brought to the pasteurization temperature. There is no incentive in the conventional wisdom or in the prior references to have a 175° hold time significantly longer than the "legal" time.

Independent Claim 1 (with the scope of original claim 8) emphasizes the step of holding the milk (or other food product) at substantially 175 degrees F for a full minute, rather than at the "legal" time interval of about 15 to 16 seconds. This specific step of denaturing for a full minute, prior to sending the milk through the UHT heat exchanger stage, is a key step in making the process work effectively. This step prevents the milk solids from settling out and coating the heat exchanger walls at the high temperature stage regenerator and the heater. This permits the milk to be heated gradually in the regenerator stages, to achieve high efficiency, e.g., 90%. Moreover, the resulting UHT pasteruized milk product does not have any detectable off flavors when consumed. The same is true also of independent claims 11 and 13.

On the other hand, if the milk is sent through the upper stage after only partly denaturing for the fifteen second hold time of the legal pasteurization hold tube, there is a tendency for the milk to denature further at the elevated temperatures when it is being heated up to the UHT temperature (e.g., 250 F). This tends to caue protein deposits on the inside of the heat exchanger tubes, clogging them. Applicant has found that denaturing at 175° F for at least a full minute permits the food product to flow at a speed that achieves a very high regeneration efficiency (up to 90 percent) without the proteins depositing themselves on the heat exchanger walls, so the UHT pasteurization process can be run for an extended period without having to shut down for cleaning. The gentle heating also results in less noticable off- or scalded flavors in the UHT product.

The need for denaturing at 175° for a full minute is entirely missed in the references, and too much denaturing is something they teach should be avoided.

Thus, what is missing from the combination of references cited by the Examiner is a reference that shows or suggests a benefit to denaturing by holding the milk or other food product

at an intermediate temperature before sending the product through an upper heat exchanger stage. Without any reference that has this teaching, the Final Rejection of the claims is improper.

McElroy U.S. Pat. 3,567,470 shows only the standard "legal" pasteurization holding tube 16 (see col. 2, lines 50 - 59), where the hold time is sixteen seconds. This is enough time for "legal" pasteurization, but not enough time to denature the product so that its proteins will not deposit in the high temperature stage.

Hasting U.S. Pat. 4,534,986 has the milk emerging from the first stage 2, 3 at 74° C (which is 165° F). Hasting takes the milk or other product at the intermediate temperature (i.e., at homogenizer 5) directly to the upper heat exchanger (7, 8). There is no hold tube in this section, and there is no mention of any dwell time to be observed. Hasting only has a UHT hold tube 20, and that is at the UHT temperature 140° C, where the hold time is 4 seconds (see col. 3, lines 41 - 49). Hasting has a brief discussion of extending the hold time here and lowering the UHT sterilization temperature from 140° C to 138° C. The only relevant teaching about hold times (col. 4, lines 19-29 of Hasting) relates only to the UHT stage, with the hold time being extended from about 2 seconds to 4 seconds. This has nothing to do with the limitations in question in Claims 1, 11 and 13.

The Examiner's rejection states that "it would have been obvious to one of ordinary skill in the art to use * * * a hold time of at least 60 seconds, in the invention of hasting since Hasting simply did not recite any specific flow parameters, since Hasting taught adjusting the ratio of flow rates (column 3, lines 29-40), adjusting the milk speed and increasing the hold time (column 4, lines 14-32), and since these flow parameters would have helped ensure full pasteurization of the milk." In the first place, a teaching of no flow or temperature parameters is *not* a teaching of substituting an intermediate temperature hold time of sixty seconds for the conventional sixteen seconds. Secondly, Hasting clearly cautions against thermal damage to the milk (column 3, line 63 to column 4, line 2), and cautions that at temperatures above 80° C (175° F) changes occur that may taint the flavour of the milk. This reference is a clear disincentive to hold the temperature of the milk at 175° F for any longer than absolutely necessary for legal pasteurization.

The Fennema *Food Chemistry* reference only states that denaturing of whey proteins will occur at temperatures above 70° C (158° F). The reference does not suggest that there could be any benefit arising from this, such as preventing protein deposits the the upper heat exchanger part of the regenerator. There is nothing in this reference that suggest the step of holding the product at a denaturing temperature of 175° F for sixty seconds, and no motivation to include such a step in a regenerative process for ultra high pasteurization of milk or other food product.

The other cited reference to Van Schagen is being used only to show tube-in-tube heat exchangers in this particular environment. There is no sixty-second hold tube in that reference.

Applicant urges that the cited combination of references lacks any reference that shows or suggests denaturing the milk or other product by holding it at 175° F for sixty seconds or more before continuing through the second regenerator stage up to the UHT temperature, and lacks any reference suggesting any benefit that might occur from denaturing the milk before heating it up to the UHT temperature. Consequently, the Final Rejection of the Appealed Claims is improper and should be withdrawn.

Respectfully submitted

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